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ABSTRACT

Information concerning methods and available materials for conserving energy is needed by small, rural schools to offset continued increasing energy costs and lack of financial support and technical assistance. The first step in developing an energy conservation policy is to obtain school board commitment and to establish an energy saving policy. Next, an energy coordinator should be appointed and commitment and involvement of school and community members enlisted. An energy audit focusing on human, structural, lighting, mechanical, and special systems should occur and generate data on annual energy costs, climate conditions, and building strengths and weaknesses. Based on the audit, achievable goals should be set. Inexpensive energy conservation practices can include lowering thermostats and water temperatures; removing decorative/unnecessary lights, caulking and/or weatherstripping windows/doors; limiting/consolidating evening activities including custodial work. Conservation methods requiring small capital outlays include installing smaller, well insulated windows, adding vestibules at outside doors; switching to fluorescent, sodium or mercury lamps; planting shade trees; installing heat recovery equipment and attic fans; repairing leaking faucets; repainting/resurfacing roofs to increase reflectiveness; developing vacation shutdown procedures. Energy saving school rescheduling programs, including the successful 4-day week, can be implemented. References and sources of additional information and available materials are provided. (NEC)

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SMALL SCHOOLS DIGEST

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ENERGY CONSERVATION IN SMALL SCHOOLS

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ENERGY CONSERVATION IN SMALL SCHOOLS

With continued increases in the costs of energy, schools are looking for methods to conserve energy. From 1969 to 1978, energy costs increased 322 percent (Canipe, 1979)! In 1973, schools used approximately 12.5 percent of their discretionary budgets for energy. By 1976, schools were using approximately 35 percent of their discretionary budgets for energy, and costs were still rising (Day, 1983).

Tenneco, Inc. in their project, Schoolhouse Energy Efficiency Demonstration (SEED) developed in 1979, found that the typical American school could cut the cost of its energy consumption by one-third through implementing local maintenance and low-cost modification programs. Many of the schools were designed when energy was plentiful and inexpensive (Tenneco, 1979) so there was little regard for energy efficiency. Building characteristics coupled with poor maintenance programs have resulted in facilities that waste as much as 25-50 percent of the energy used (Stephan, 1979).

Energy conservation measures are further hampered in small schools by lack of financial support, and technical help, and insufficient administrative time to develop an adequate plan. Isolation and financial factors restrict small school personnel from attending workshops, meetings, etc., concerning energy conservation measures (Stephan & others, 1979). Because energy conservation plans for small schools are usually developed locally, information concerning methods and available materials that can be used by small schools is needed.

How Should Energy Policy Be Established?

The first step in developing an energy conservation policy is to obtain school board commitment and to establish an energy saving policy. After a policy is established, an energy coordinator or czar should be appointed to oversee the conservation program. Finding such a person may be difficult in a small school, but it is essential.

Having developed a policy and appointed a coordinator, the third step is to raise public consciousness to the need for commitment. The most effective efforts have been those which involve as many people as possible in the energy conservation program. Teachers, students, support personnel, and the community should become involved. Also, the more successful programs have offered an incentive plan whereby the teachers, students, or the school receive a portion of the savings the school has realized.

How Can An Energy Audit Be Performed?

An energy audit should then be started. The energy audit consists of two major data bases. The first data base consists of information on the buildings and the cost of energy for at least the last 12 months of each utility used. A regular schedule should be developed to read the utility meters and record the consumption. During this phase, information about the local climate to determine the degree-days, wind speed and direction, and cloudless days should be compiled (Woodbury, 1980).

The second portion of an energy audit is to walk through and examine the building to find areas where energy may be escaping, or where energy may be saved. Often the smallest expenditures produce the greatest savings. Changes in operational procedures can realize a 5-25 percent savings in energy costs. Small capital improvements can reduce energy costs 25-35 percent (Stephan, 1979).

When performing the initial energy audit, five general areas should be noted: human systems, structural systems, lighting systems, mechanical systems, and special systems.

Human Systems

This area includes such things as making sure that lights are turned off when a room is not in use, having shades drawn or opened properly to make the best use of the sun or the shade's insulating capabilities, and consolidating evenings used for extra-curricular activities. It consists of awareness programs and procedural changes that can be accomplished with very little cost to the district.

Structural Systems

The structural systems portion of an energy audit examines the construction of the total building. Blueprints of the school which show any additions that have been added to the original building should be examined. From the audit information, insulation values, percentage of window areas in walls, and other possible energy leaks may be found. During the structural systems audit, the energy coordinator should examine doors, windows, vents and other sources where air may leak into or out of the building.

Lighting System

Many small and inexpensive changes in the lighting system can save on the electrical costs. During an audit check, see if there are places where bulbs can be removed, or where incandescent bulbs can be replaced by fluorescent, sodium, or mercury lamps. Also check the lights and light fixtures to see if they are clean. Dirty lights can reduce their illumination capacity by 50 percent (Canipe, 1979).

Special Systems

Special systems include school cafeteria areas, classrooms for vocational education, and transportation of students. It may also include looking at the area directly surrounding the school plant. Simple remedies as planting trees or shrubs on the windward or sunny side of the building may reduce energy costs by 10-34 percent (Tenneco, 1979).

After performing your energy audit, set goals to achieve. Remember that each school is unique, and what will work at other schools may not work for you.

What Are Some Inexpensive Conservation Practices?

1. Lower thermostat settings (68° for winter and 78° for summer)
2. Set back thermostats 10° at night
3. Remove unnecessary or decorative lights
4. Lower hot water heater temperature to between 100° and 110°
5. Caulk and align all windows
6. Weatherstrip and align doors
7. Limit access to school (fewer evening activities)
8. Consolidate evening activities to one or two evenings per week
9. Clean light fixtures
10. Have custodial work done during the day or every other day
11. Cut back on outside air intake for ventilation
12. Turn off lights in rooms when not in use
13. Draw drapes, blinds, or window shades during evening hours, dark days, or sunny days depending on the time of the year
14. Consolidate activities into fewer rooms
15. Use natural light when possible

What Are Some Conservation Methods Requiring Small Capital Outlays?

1. Install new windows of smaller size with better insulating capabilities
2. Add insulation to the building where necessary
3. Hire someone to check the heating/ventilation and air conditioning units
4. Add a vestibule or wind break at outside doors
5. Replace incandescent lighting with fluorescent, sodium, or mercury lamps
6. Install parabolic reflectors or diffusion screens to lights
7. Plant trees or shrubs on windward side of building or shade portions of the building
8. Install better switches for lights; usually lights by windows can be turned off when there is enough natural light
9. Replace worn boiler controls
10. Install heat recovery equipment

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11. Lower height of lighting fixtures
12. Use photocell and/or astronomical time clock controls for security lighting
13. Repaint or resurface roof to make it more reflective if necessary
14. Develop shutdown procedures to maximize savings during holidays
15. Install attic fans to exhaust hot air on warm days
16. Repair leaking faucets
17. Provide inservice programs for custodial personnel
18. Develop a scheduled maintenance and repair program
19. Incorporate an energy conservation unit into the curriculum
20. Use light reflective colors when repainting rooms

How Does Rescheduling of School Year help Save Energy?

There have been various types of rescheduling programs attempted depending upon the area of the country. Many involve lengthening the Christmas vacation in northern climates or determining which months are the coldest and shutting down the school during that period of time. However, many of those systems have proven counter-productive to total savings of energy.

The 4-day week has proven to be the most productive rescheduling program. From studies completed at schools using the 4-day week, the following savings were reported by Richburg and Edelen (1981):

1. Gasoline consumption for buses was reduced 22.5%.
2. Bus maintenance costs were reduced by 18%.
3. Electrical consumption was reduced by 23%.
4. Heating fuel consumption was reduced by 7-25%.

Where Can I Receive Additional Information?

Source	Available Materials
National Technical Information Service U.S. Department of Commerce 5285 Port Royal Road Springfield, Virginia 22161	Energy Audit Workbook for Schools
Tenneco, Inc. Public Affairs Department P.O. Box 2511 Houston, Texas 77001	Something Special from SEED (performing energy audits) Something Special for Teachers (curriculum aids) The Fourth R: Resourcefulness in School Energy Conservation (film: awareness)
Director, Energy and Education Action Center Room 514 - Reporters Building 300 7th Street S.W. Washington, D.C. 20202	
Technical Information Center Box 62 Oak Ridge, Tennessee 37830	
ERIC Clearinghouse for Science, Mathematics, and Environmental Education 1200 Chambers Road Columbus, Ohio 43212	
American Association of School Administrators 1801 North Moore Street Arlington, Virginia 22209	
Energy Conservation Council P.O. Box 7800 Atlanta, Georgia 30309	
Association of School Business Officials Publication Department 720 Garden Street Park Ridge, Illinois 60068	
Colorado Department of Education Alternative Calendar Programs C.L. Stiverson, Coordinator 303 W. Colfax Denver, Colorado 80204	

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Tenneco, Inc. **Something Special from SEED: Energy Efficiency for Educators and Students.** Houston, Texas: SEED, 1979. (ERIC Document Reproduction Service No. ED 182 807).

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